

Candidate Name	Centre Number	Candidate Number
		2



**GCE AS/A level**

312/01

**BIOLOGY – BI2**

P.M. MONDAY, 1 June 2009

1½ hours

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	5	
2.	11	
3.	13	
4.	11	
5.	11	
6.	9	
7.	10	
TOTAL MARK		

### INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

### INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The quality of written communication will affect the awarding of marks.

1. (a) Diffusion and active transport are two processes by which molecules move in living organisms.

(i) Describe the process of diffusion. [2]

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(ii) State **two** differences between diffusion and active transport. [2]

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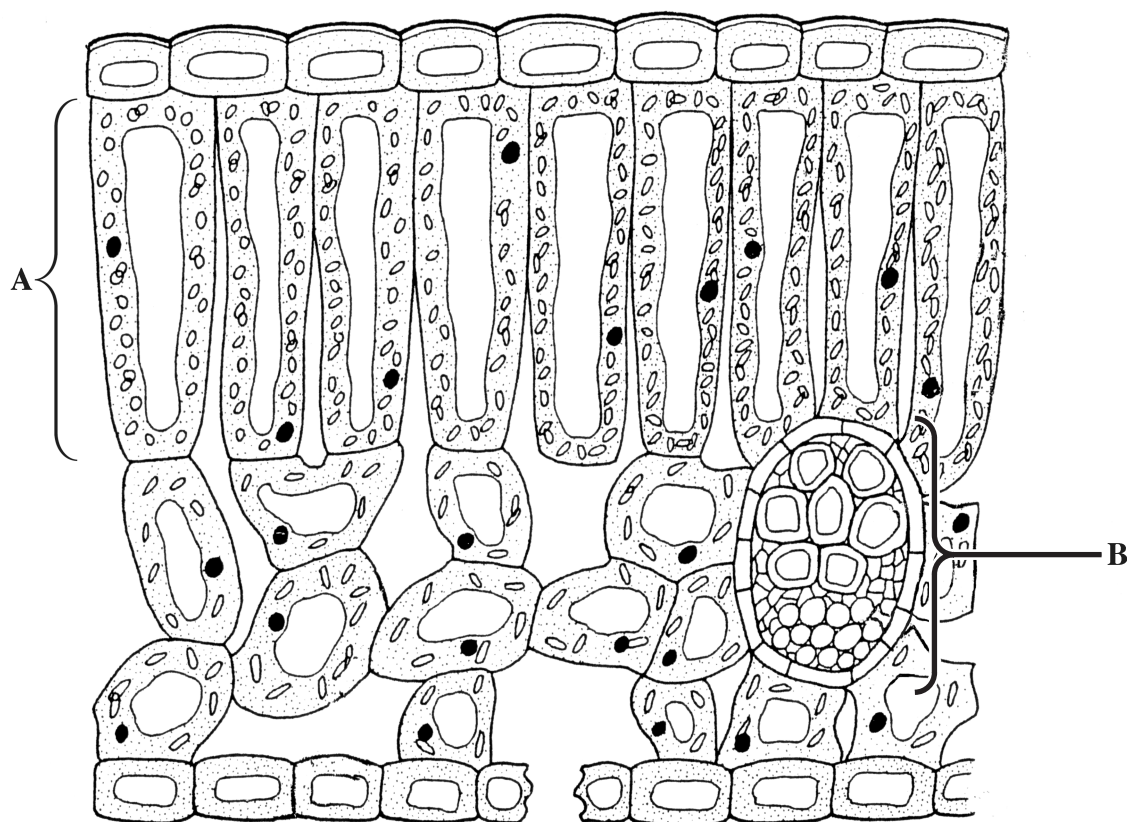
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(b) Name **one** *other* method by which molecules are moved. [1]

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**(Total 5 marks)**

2. (a) The diagram below shows a section of a leaf.



Identify the structures **A** and **B** and state the function of each.

[4]

**A** Name .....

Function .....

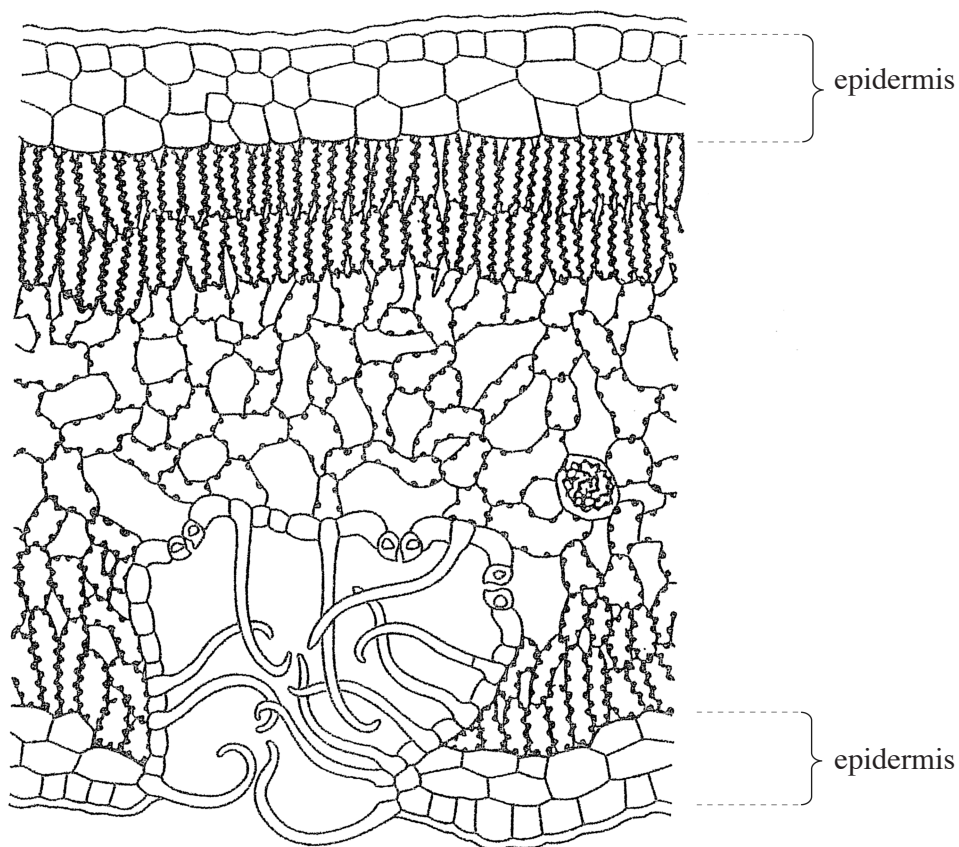
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**B** Name .....

Function .....

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- (b) The diagram below shows a leaf taken from a plant that lives in a hot and dry environment.



- (i) State the name given to the types of plant that live in hot, dry environments. [1]
- .....
- (ii) Use label lines marked **A**, **B** and **C** to indicate on the diagram **three** different features of the leaf that enables the plant to live in hot, dry conditions. [3]
- (iii) Explain how each of the features, which you have indicated in (ii), helps the plant to live in its environment. [3]

**A** .....

**B** .....

**C** .....

(Total 11 marks)

3. (a) Describe what is meant by a double circulatory system in a mammal and describe **two** advantages of such a system. [4]

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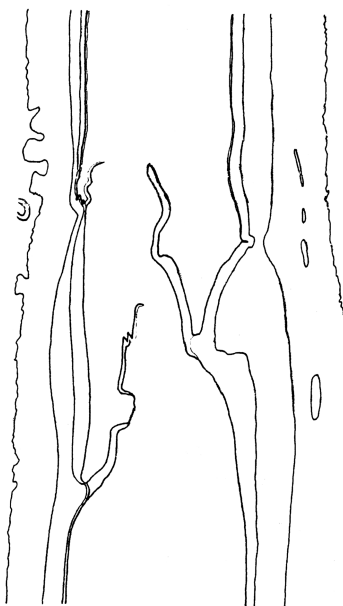
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- (b) The drawing shows a longitudinal section (LS) of a mammalian blood vessel as seen through a microscope.



Name the type of blood vessel shown and give a reason for your choice. [2]

Name .....

Reason .....

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- (c) Complete the table to provide details about the four blood vessels listed. Where appropriate, name the **chamber** of the heart involved. [4]

<i>Blood vessel</i>	<i>Carries blood from</i>	<i>Carries blood to</i>	<i>Blood is oxygenated/deoxygenated</i>	<i>Pressure is high/low</i>
Aorta				
Vena cava				
Pulmonary artery				
Pulmonary vein				

- (d) Describe the functions of capillaries. [3]

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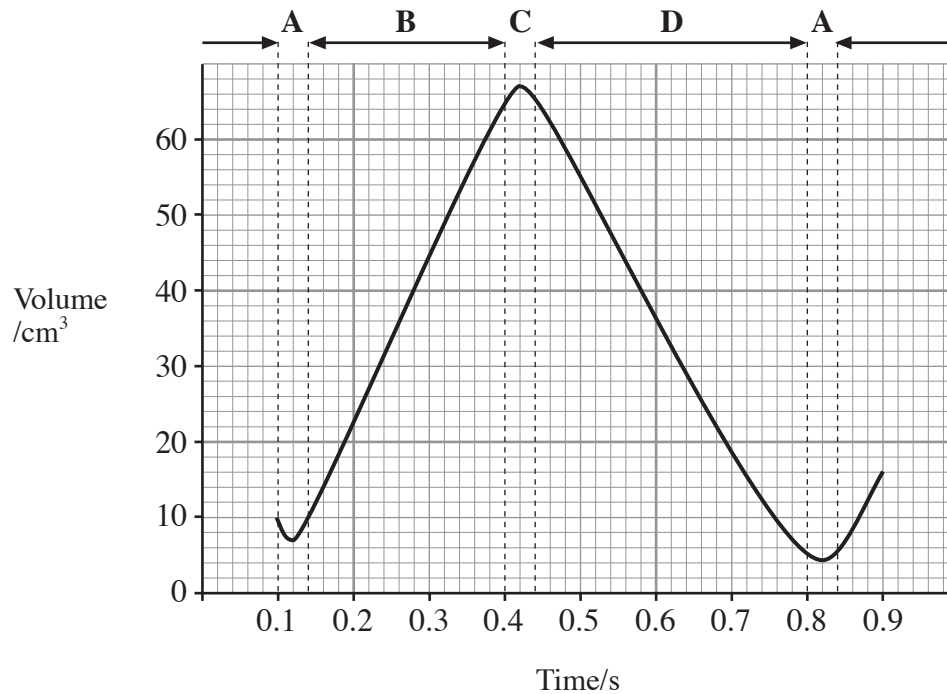
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**(Total 13 marks)**

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4. The graph shows the volume changes of blood in the left ventricle of a mammalian heart during one complete cardiac cycle. The letters A, B, C and D on the graph indicate phases of the cycle.



- (a) (i) Calculate the rate at which this heart is beating. Show your working. [3]

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- (ii) Name **two** internal systems that can change the heart rate. [2]

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(b) Use the letters A, B, C or D from the graph to indicate when the following occur.

(i) The bicuspid (atrio-ventricular) valve is open.  [1]

(ii) The bicuspid (atrio-ventricular) valve closes.  [1]

(iii) The aortic valve is open.  [1]

(iv) The aortic valve closes.  [1]

(c) Describe the function of the atrio-ventricular node (AVN). [2]

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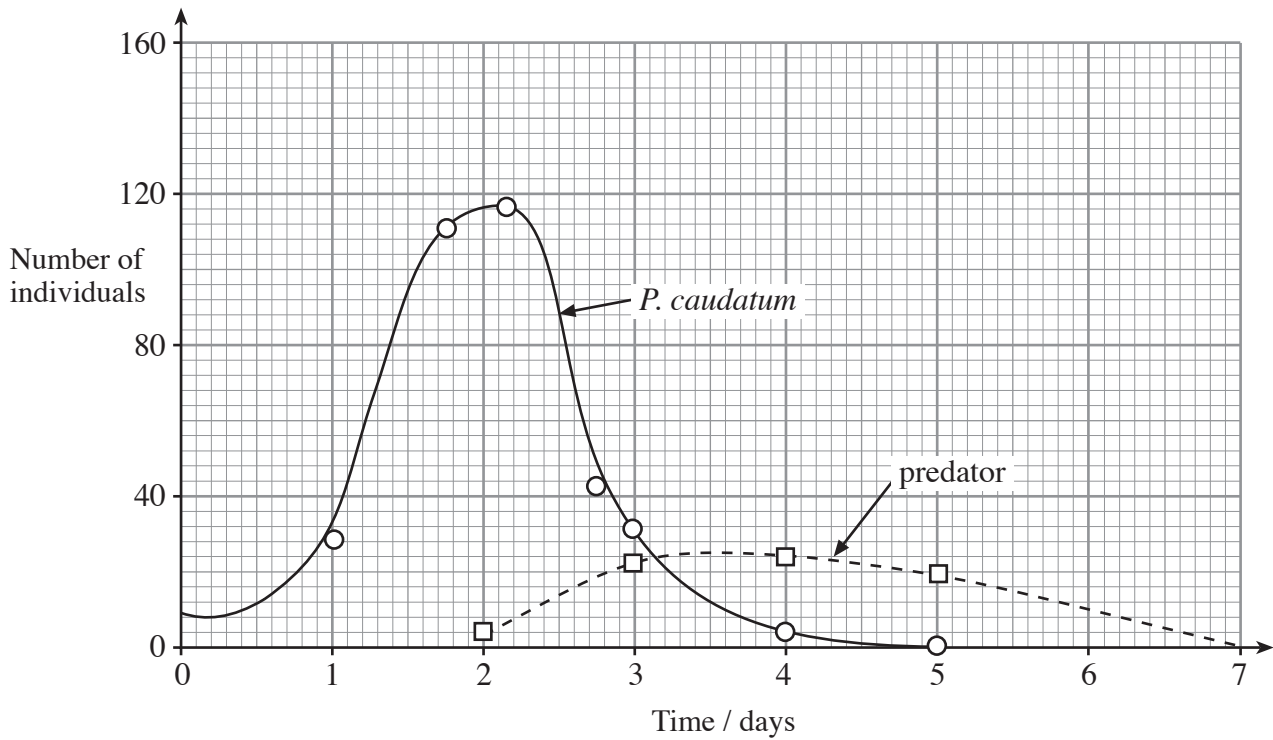
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**(Total 11 marks)**

5. (a) The graph shows the growth of a population of a single celled organism called *Paramecium caudatum*. This population was grown in a culture solution in a flask. A predator of the *Paramecium* was added to the culture at day 2.



- (i) Describe what is meant by the term *predator*.

[2]

- (ii) Explain the results shown in the graph from day 1.

[4]

(iii) On the graph, draw a population growth curve for the *Paramecium* if the predator had not been added. [2]

(iv) Explain why the curve in (iii) is the shape drawn. [3]

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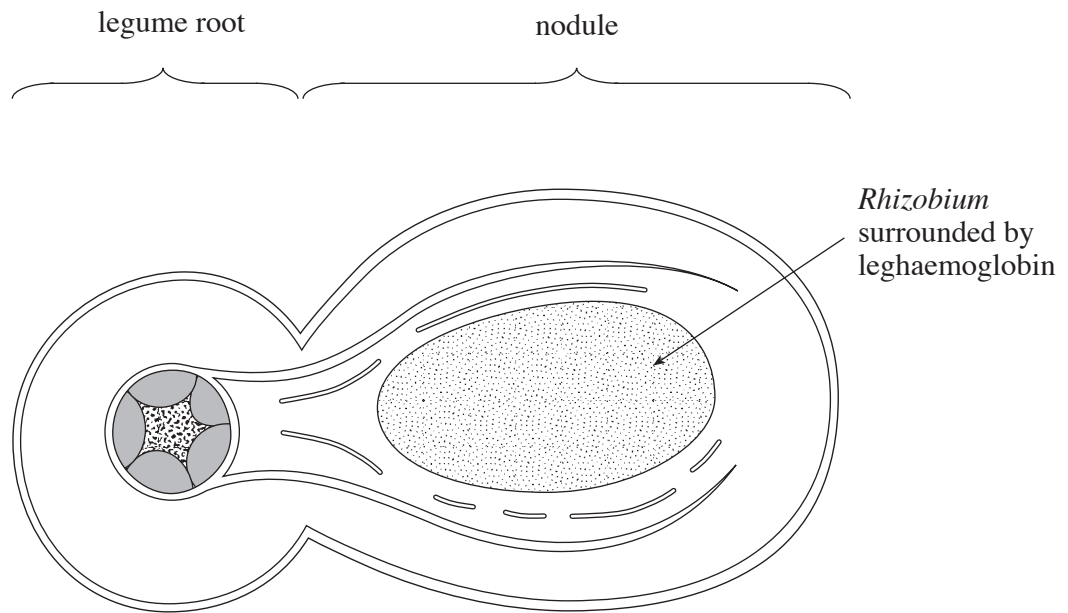
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**(Total 11 marks)**

6. *Rhizobium* is an anaerobic bacterium that lives in nodules found on the roots of legume plants, such as beans and clover. It uses the enzyme nitrogenase to 'fix' atmospheric nitrogen. Surrounding the bacterium is a substance called leghaemoglobin which has similar properties to the haemoglobin found in red blood cells. *Rhizobium* and the legume plant are in a mutualistic (symbiotic) relationship in which each derives benefit. The diagram of a transverse section, illustrates this arrangement.



- (a) (i) Describe what is meant by the phrase *fix atmospheric nitrogen*. [2]

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- (ii) Describe how 'fixed' nitrogen is used by plants. [2]

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- (b) (i) Suggest the 'benefits' that the *Rhizobium* obtains from its mutualistic relationship with the legume. [2]

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- (ii) Describe **one** difference and **one** similarity between a mutualistic relationship and a parasitic relationship. [2]

Difference .....

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Similarity .....

.....

- (c) Suggest **one** use for the leghaemoglobin. [1]

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**(Total 9 marks)**

**Either,** (a) Describe how carbon is cycled. [10]

(ii) Describe how pressure changes are achieved and bring about inspiration in a mammal. [5]

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Examiner  
only

(312-01)